FutureFlight Central

Customer Guide

FFC-WI-4000

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This Customer Guide describes the FutureFlight Central (FFC) facility and its capabilities and will also give you an overview of the process for bringing your simulation to FFC. It covers our interactions from first contact through conducting simulations and obtaining results. The Guide includes information about the available services at this facility and our standard practices and procedures, and other information to help you achieve your simulation objectives.

FFC is a state-of-the-art man-in-the-loop simulator that can present a 360-degree view of a 3 dimensional database out of our twelve 7 1/2 by 10 foot windows. Jointly developed by NASA and the FAA, the facility resides at Ames Research Center. The simulator can display human or computer controlled moving models in the scene. The facility can be a full mission, real-time air traffic control tower simulator or can be used for any other application where an interactive 360-degree computer generated visual is beneficial. As an air traffic control tower simulator, the facility can be used to validate new technology, procedures, and airport configurations prior to field deployment without the risks involved in using an actual airport. Besides simulation of air traffic control towers, the facility can be used as a cost effective and safe environment to do emergency response planning and training, simulate ship board operations, performing human factors studies, siting studies, noise modeling, visualization of environments captured by remote cameras, etc.

If you wish to visit our facility, please contact the FFC Facility Manager:

Nancy Dorighi
Mail Stop 262-8
Ames Research Center
Moffett Field, CA 94035-1000

Phone: (650) 604-3258
Email: Nancy.S.Dorighi@nasa.gov

For more information see the FFC web site at http://ffc.arc.nasa.gov.

1. Agreement Phase

1.1 Initial Contact

Initial contact is made with the FFC Facility manager, Nancy Dorighi. Her contact information is listed above.

If possible, please contact the FFC Manager at least six months before the desired simulation date to discuss projected schedules, general requirements, cost and funding, and other requisites for your simulation. Simulation development times will vary, depending upon the complexity of the simulation, the requirements for an airport or other 3-D database, and current scheduling in the facility.

1.2 Submit Simulation Requirements Form

During the next stage, the FFC Manager will send you a Simulation Requirements Form (Form number WI-4010). The FFC Manager can assist you in filling out the form if necessary. On the Simulation Requirements Form you designate your official Customer Point of Contact (CPOC) and include information about simulation objectives, proposed simulation length, 3-D database or airport and scenario requirements, security/proprietary data concerns, customer-supplied hardware or software, and any special or unusual requirements. FFC personnel will review the proposed simulation to ensure that the simulation requirements and schedule constraints can be met by FFC. You will then be provided with a preliminary cost and schedule for your project.

Nearly every simulation needs to have a Principle Investigator who will be responsible for the scientific validity of the experiment. NASA Ames may be able to supply a Principle Investigator for some projects.

Your CPOC is the only person authorized to approve changes to the simulation requirements, cost, or schedule. The CPOC must be present or represented at all project review meetings and during the simulation itself to make decisions that are often needed during this critical time.

1.3 Assignment of a Simulation Project Manager (PM)

Upon your acceptance of the cost and schedule for the project, the FFC Manager will assign a Project Manager (PM) to the simulation and notify you of the PM's name and contact information. From this stage on, the PM will be your point of contact with FFC. The PM will facilitate your requests, track your requirements, manage the development and operations of your simulation, and oversee the delivery of your data.

1.4 Customer Agreement

The PM will work with your CPOC to clarify the requirements of your project as needed during this phase. When both parties are satisfied that the project is clearly defined, the PM will draft a Customer Agreement. This agreement will formalize the simulation requirements, and a copy will be provided to the CPOC and a representative from the sponsoring organization for concurrence. Your CPOC and the sponsor will signify concurrence by signing and returning a copy of the document. A Memorandum of Understanding (MOU) is the usual vehicle for a Customer Agreement when simulations are sponsored by a federal agency. If the simulation sponsor is not a federal agency, a Space Act Agreement with NASA will be required, and will serve as the Customer Agreement. The Customer Agreement will contain the following items as applicable:

1. General terms and conditions
2. Introduction and background of the simulation
3. Identification of the simulation's goals and objectives
4. The Name of the Customer Point of Contact (CPOC) and the FFC Project Manager (PM)
5. Cost
6. Simulation milestones and dates for development, testing, reviews, and operations
7. Resources to be provided by the customer in support of the simulation
   a Equipment, software, hardware, fabrication
   b Human Resources
8. What FFC will provide in support of the simulation
   a Equipment, software, hardware, fabrication
   b Human Resources
9. Deliverables required from the customer
10. Data requirements (media, format, retention) including security issues
11. Other deliverables from FFC to the customer
12. Access to the facility for customer personnel
13. Any changes to agreement following initial approval

If the scope or requirements of the project change significantly after the Customer Agreement is signed, the PM will modify the agreement and resubmit it to the CPOC and sponsor for concurrence. Significant changes are those changes that will impact the overall cost or schedule of your project. Minor changes can be documented through e-mail exchanges with the PM.

2. Planning Information

2.1 Normal Operating Hours

FFC operates Monday through Friday, and in general works standard 8:00 a.m. to 5:00 p.m. hours. Other times can be made available for hardware and software development and integration, or for operations. Inform your PM of any special access requirements. An FFC employee must escort all non-Ames employees working in FFC, so arrangements must be made in advance.

2.2 Visitors to FFC

All visitors to FFC who do not have a NASA employee badge will need to obtain an Ames visitor badge. The process takes several days for US citizens and several weeks for foreign nationals. Provide your PM with the names and citizenship of any people who may be in attendance during meetings, practice days, dry runs, and operational days. A small briefing room, which holds about 15 people, is always available to customers during operational days. If you need a large meeting room or other special accommodations the PM can usually arrange this with sufficient notice. If you wish to order catering for your visitors, you are responsible for making arrangements for deliveries, etc.

2.3 Air Traffic Controllers

If required for the project, the Facility Manager can work with the FAA to coordinate the scheduling of Air Traffic Controllers. The availability of controllers will dictate when your simulation can run in the facility and may impact the development schedule, as well. FFC requires input from a supervisor or controllers from the simulated airport when setting up scenarios, defining rules of operation for the airport in the database, training pseudo-pilots, and conducting your simulation.

2.4 Estimating the Duration of the Simulation

Each simulation has unique needs, and the majority of the simulation requirements must be finalized before an accurate estimate of the amount of simulation time you will require in order to fulfill your research objectives can be determined. The Facility Manager and your PM will help you determine the number of days you will need to operate the simulation. There are, however, several rules of thumb that will help you determine the appropriate length of your simulation.

A typical time to complete each run through a simulation scenario is about one hour. Plan to complete four one-hour runs a day. This will allow time between runs for subject surveys, a short break for all participants, verification of data collection, and preparing for the next run.

2.5 Estimating the Cost of the Simulation

FFC pricing is based on a number of factors including:

- Number of days required to run your simulation in the facility
- Number of FFC-supplied personnel (i.e., pseudo-pilots, controllers, Principle Investigator, etc.)
- Amount and type of data requested

- Post-simulation data processing, analysis, or reports requested
- Creation, modification, or reuse of visual database
- Custom hardware and software development
- Number of exercises (scenarios) developed, and the size and complexity of the exercises
- Number and complexity of last minute requirements and changes

The FFC Facility Manager and the PM will help you estimate the cost of your simulation.

2.6 FFC Use of the Facility During Simulations

FFC may take video recordings or photographs in the tower cab or pseudo-pilot rooms during the simulation, or generate video and/or audio recordings during simulations for use in training FFC personnel or for marketing purposes. With your permission, we may wish to interview subjects to obtain feedback about the operations and their impressions of the facility. If you have concerns in this area, speak with your PM.

2.7 Standard Data Available from FFC

Your data requirements for the simulation must be specified in the Simulation Project Requirements form and the Customer Agreement. FFC offers a standard set of simulation data that can be collected during your simulation runs. If you need additional data, a different format, or different output media, discuss this with your PM.

FFC Standard Simulation Data

Type of data	Format	Media
Digital recording of audio data (i.e. voice communications between pilots and controllers	Sound Design II, Wav, AIFF	CD
Analog recording of ambient voice communications in FFC tower cab	VHS, Super VHS, Beta, or standard audio	Video or audio tape
Time stamped “events” flagged by our software (touchdown, taxi information, pushback, etc.)	CSV or Excel	CD, 8mm or 4mm DAT tape, Zip or Jaz disk
Video recordings of up to five computer generated displays	VHS, Super VHS, Beta	Video Tape
Video recordings of up to four camera views of tower cab activity	VHS, Super VHS, Beta	Video Tape
Continuous time stamped positional data of all aircraft	HLA – MAK format, Excel	CD, 8mm or 4mm DAT tape, Zip or Jaz disk
Statistical data describing airport capacity and efficiency	Excel	CD

Information generated by FFC is generally very secure. FFC computers and networks are not accessible through the internet or any other network outside FFC (with the exception of our software partner, Adacel Technologies with whom we have an IT security agreement in place). If you require special security measures, contact your PM as soon as possible.

FFC usually publishes a summary of the simulations conducted at our facility both on the web and in hardcopy. If there are restrictions on the public disclosure of information about your simulation, please tell your PM early in the development process.

FFC reserves the right to take photographs, or make audio and/or video recordings during operations for training and marketing purposes. We may request interviews with customer representatives and subjects to obtain feedback on the operations and value of the facility. We may ask your permission to bring in a limited number of guests on a strictly non-interference basis during simulation development, training or operations days. If any of this is a problem, please let your PM know as soon as possible.

Unless directed otherwise, FFC will retain copies of your databases and any scenarios developed for your simulation. These will be available to you for future work at FFC.

3. Simulation Development Milestones

3.1 Simulation Planning Meeting

FFC will conduct an Initial Simulation Planning Meeting. Participants will include, at a minimum, your CPOC, the PM and FFC staff supporting the simulation, and the Principle Investigator. The meeting will address:

1. Simulation description & schedule
   a. Simulation dates
   b. Data requirements (type of data, format, media, delivery schedule, etc.)
   c. Training for subjects (if required)
   d. Customer-supplied technology (hardware, software, outside facilities, etc.)
   e. Requests for FFC to supply additional hardware, software, or other technology
   f. Customer access to the facility other than during simulation days
   g. Daily simulation plan
   h. Development schedule and milestones, including Simulation Readiness Review and dry run dates

2. Software requirements
   a. Visual database
   b. Scenarios
   c. Other

3. Hardware requirements
   a. Tower configuration
   b. Other displays needed
   c. Communications
   d. Other

4. Data Security requirements

Your CPOC must be available during the development phase to assist the PM in refining requirements, and coordinating the development efforts. If you are simulating an airport, it is very important that a controller or supervisor from that airport is available to answer questions about standard airport operations and practices. FFC personnel will need access to photographs, CAD drawings of the airport, the airport tower, and other source data. Your CPOC will be asked to approve the databases and scenarios developed for your simulation.

Any requests for changes to requirements or for assistance should be made through your CPOC to the PM.

3.2 Integration of Customer-Supplied Technology

Customer-supplied hardware and software that will reside in FFC must arrive at the facility by a date agreed upon with the PM. You should expect to install, test, and maintain all the software and hardware you supply. FFC will make any hardware interface connections required, either within or outside the facility, and will be available to support your integration testing. Hardware or software purchased by FFC to support your simulation will be installed by FFC personnel, and will remain at FFC when the simulation has been completed.

The PM will log all customer-supplied items when they arrive and ensure the return of this material at the end of the simulation.

If you wish to interface an outside facility with FFC, we must review and approve the computer security measures in place at the outside facility in order to maintain the security of the programs and data resident at FFC.

3.3 Final Preparations

The last weeks before the start of your simulation will be taken up largely by final testing of the simulation and fine-tuning of the scenarios with pseudo-pilots and practice controllers in the facility.

3.4 Simulation Readiness Review

A Simulation Readiness Review (SRR) is conducted prior to the start of each simulation. Participants will include at least your CPOC, the PM and FFC staff supporting the simulation, and the Principle Investigator. The agenda will cover all issues addressed in the Simulation Planning Meeting as well as any other concerns about operations that may have arisen. The minutes from this meeting will include any issues identified that still require resolution. Your CPOC will be asked to concur with the minutes. This concurrence, along with the resolution of any outstanding action

items, will signify your agreement that the development process is complete, and that your requirements have been met.

4. Operations

Prior to participating in the simulation, subjects must complete a Human Research Minimal Risk Consent Form. A copy will be provided to you by your PM. This form describes "minimal risk", indicates the consent of the subject to participate, and in a separate section gives permission to NASA to video tape the research and release data gathered outside NASA.

Your CPOC must be available during all days of simulation to observe operations, answer questions, and make decisions as needed during the simulation runs. All changes and requests during operations must be communicated by your CPOC to the FFC PM, who will coordinate the activities of all other FFC staff.

One window of the out-the-window scene or the view from a video camera in the tower can be displayed in the Briefing Room for remote viewing.
Just prior to completion of the simulation, the CPOC will be asked to fill out a Post Experiment Critique form. This form allows you to rate the performance of the FFC facility and staff during your simulation development and operation. Your honest feedback is appreciated and will help improve our facility and operations.

5. Post Simulation Phase

FFC may request that you attend a post-simulation debrief, or your CPOC may request one. We will discuss any open issues and the feedback from the Post Experiment Critique form.

The PM will deliver simulation data to the CPOC or other designated individuals. FFC may keep copies of some audio data or recordings of data runs for future training and marketing purposes. Let your PM know if this is not acceptable.